increased risk, acquainted with the signs and symptoms of infection, and informed that they need to consult an ophthalmologist promptly if they experience such warning signs or symptoms. Ocular surface disease such as corneal epithelial defects, severe tear deficiency, entropion, or lagophthalmos should be treated. Prophylactic antibiotics can be considered for patients with chronic epithelial defects; however, the routine use of prophylactic topical antibiotics in this setting is controversial. Since efficacy has not been established, chronic use may promote growth of resistant organisms. Topical antibiotics should be prescribed to prevent acute bacterial keratitis in patients who wear contact lenses and present with a corneal abrasion. Similarly, a broad-spectrum topical antibiotic is recommended for any patient presenting with corneal abrasion following trauma. This strategy helps prevent not only bacterial infection but fungal infection as well.[125] Prophylactic topical antibiotics following corneal abrasion has been shown to prevent ulceration when treatment is started within 24 hours of the abrasion.[125, 126] *(I+, Moderate, Strong)* In patients with contact-lens associated abrasion, patching the eye or using a therapeutic contact lens is not advised due to concerns for increased risk of secondary bacterial keratitis.

Treatment

Initial Treatment

Topical antibiotic eye drops are capable of achieving high tissue levels and are the preferred method of treatment in most cases of bacterial keratitis.[127] The majority of community-acquired cases of small noncentral ulcers resolve with topical empiric therapy.[4, 5] (See Table 4 for recommendations about antibiotic therapy.) In selected cases, the initial treatment choice may be guided by the results obtained from smears. A higher minimum inhibitory concentration to the treating antibiotic is associated with worse clinical outcomes, including slower re-epithelialization and more lines of visual acuity lost at 3 months.[128]

Ocular ointments lack solubility and therefore the therapeutic agents are not able to penetrate into the cornea significantly for optimum therapeutic benefit. However, ointments may be useful at bedtime in less severe cases and may be useful for adjunctive therapy.

In cases where adherence is questionable or a delay in obtaining fortified antibiotics is anticipated, subconjunctival antibiotic injections may be helpful. Systemic therapy may be useful in cases of scleral or intraocular extension of infection or systemic infection such as *N. gonorrhoeae*. Collagen shields or soft contact lenses soaked in antibiotics may be considered to enhance drug delivery but have the potential risk of inducing drug toxicity and corneal epithelial hypoxia.[129-132] Collagen shields and soft contact lenses may also become displaced or lost, leading to unrecognized interruption of drug delivery.

For central or severe keratitis (e.g., deep stromal involvement or an infiltrate larger than 2 mm with extensive suppuration), a loading dose such as every 5 to 15 minutes followed by frequent applications, such as every hour, is recommended. Cycloplegic agents may be used to decrease synechiae formation and decrease pain from anterior segment inflammation associated with bacterial keratitis.

Single-drug therapy using a fluoroquinolone has been shown to be as effective as combination therapy utilizing antibiotics that are fortified by increasing their concentration over commercially available topical antibiotics.[127, 133-138] Fortified topical antibiotics should be considered for large and/or visually significant corneal infiltrates, especially if a hypopyon is present. (See Appendix 6 for instructions on preparing fortified topical antibiotics.) Ciprofloxacin 0.3%, ofloxacin 0.3%, and levofloxacin 1.5% have been approved by the FDA for the treatment of bacterial keratitis.[139-141] Compared with ofloxacin 0.3%, levofloxacin 1.5% demonstrated equal efficacy in the endpoints of complete re-epithelialization and no progression of infiltrate for two consecutive visits.[115] Some pathogens (e.g., *Streptococci*, anaerobes) reportedly have variable susceptibility to fluoroquinolones,[134, 142] and the prevalence of resistance to the fluoroquinolones appears to be increasing.[20, 30, 143, 144] Individual risk factors for fluoroquinolone resistance include recent fluoroquinolone use, hospitalization, age, and recent ocular surgery.[145, 146] A study of over 3,200 ocular isolates collected from 2009 to 2013 found methicillin resistance in 42% of *Staphylococcal* isolates, with a high concurrent resistance to fluoroquinolone; however,